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At the beginning of the past week, we reached the eastern continental slope of the Antarctic Peninsula. Here the Weddell Sea Bottom Water streams as a layer of some hundred meters thickness above the sea bottom to the north. This very cold water mass with a temperature below -0.7°C is formed at the western and southern boundaries of the Weddell Sea. The water mass formation process starts with wind induced upwelling of warm saline water in the Antarctic Divergences. The so-called Warm Deep water enters into the Weddell Sea from the north with temperatures of up to 1.5°C. Then it flows at the surface to the south towards the wide shelf areas. In contact with the atmosphere it loses heat, but simultaneously its salinity decreases due to the gain of freshwater from precipitation, melt water from ice shelves and icebergs and in summer by thawing of sea ice.

In winter enough heat is lost to the atmosphere that the water freezes again and releases salt into the water column below. Due to the salt content of seawater, its freezing point is at -1.8°C. The salinity increases until the water is dense enough to sink. On the wide shelves of the southwestern Weddell Sea, dense enough water is formed to sink down the continental slope into the deep sea. Part of the saline shelf water penetrates into the cavities below the ice shelves. Ice shelves originate from snow accumulation on the continent from where ice streams flow towards the coast, where the land ice goes afloat. At the grounding line at the coast, the ice shelf can extend down to 1500 m. In this depth the freezing point is lowered by the pressure and seawater is still liquid at -2.5°C. If it comes in contact with the ice shelf, the latter starts to melt. The input of meltwater reduces the salinity of the water, its density decreases and it ascends along the underside of the ice shelf. Then pressure decreases and part of the ascending water refreezes again. It forms a so-called marine ice shelf. Some times the result of this process becomes visible at the surface as a green iceberg. The remaining water leaves the cavity and can be observed, e.g., in the Filchner Depression as Ice Shelf Water with a temperature of -2.2°C. It spills over the sill of the depression and sinks down the continental slope into the deep sea.

Because of the action of the Coriolis force, the downward flow is trapped on the continental slope and guided to the north where it is seen as extended cool bottom water layer on our transect. During this sinking process it mixes with the adjacent water masses and the product of the mixture finally leaves the Weddell Sea through the gaps in the ridges limiting the Weddell Sea to the north. By this process the Weddell Sea contributes to the renewal of the global bottom water layers. Our measurements indicate that the temperature of the Weddell Sea Bottom Water has been steadily increasing during the last 15 years. In this layer of young Weddell Sea Bottom Water we carried out another ANDEEP station which impressed us by the abundance of the deep-sea fauna that we sampled there.

On Wednesday we reached the western most point on our transect across the

Weddell Sea after having crossed a tongue of sea ice stretching from the southern Weddell Sea into the Powell Basin. Since this was not locally formed new ice but consolidated floes coming from the south, it was thick enough to slow down our progress. However, the tongue was not as wide as we had expected in our earlier planning, so that we finally gained time in reference to our plan. On the shelf we turned back to the east and started a transect through the Powell Basin with 3 ANDEEP stations, CTD and water samples.

On Monday morning the last ANDEEP station in the Powell Basin was finished and we took off to the west towards King George Island where we are sup----posed to desupply the Dallmann station after the summer. In between the stations, the marine mammal group tows an acoustic streamer to detect the sounds of whales buried in the noise of the ship. During the first part of the cruise, only few whales were sighted, however during the last week many whales could be observed. In particular the infrared cameras proved to be very efficient.

With the best wishes from all on board
Eberhard Fahrbach